Amendments to the Drawings

The attached sheets of drawings include changes to Figure 1, Figure 4, and Figure 5. These sheets replace the original sheets including Figure 1, Figure 4, and Figure 5.

In Figure 1, the designation "Prior Art" has been added. This sheet, replaces the original sheet including Figure 1.

In Figures 4 and 5, the reference character numbers in the drawings have been changed by placing the number "2" prior to each reference character number so that reference character numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 now read as 21, 22, 23, 24, 25, 26, 27, 28, 29, 210, 211, 212, 213, 214, 215, 216, and 217. This change was made to clarify that the reference characters of Figures 4 and 5 differ from those of Figure 2. Annotated copies of Figures 4 and 5 are included, which show the changes in red.

Attachment:

Replacement sheets for Figures 1, 4, and 5.

Annotated Sheets Showing Changes to Figures 4 and 5 in red.

REMARKS

In the specification, the paragraph at lines 5-25 on page 3 has been amended to correct a typographical error and replace "next" with nest at line 8. The first two lines of the Abstract of U. S. 3,871,445 refer to a "nest of contact tubes".

The paragraph at line 25 on page 3 to line 13 on page 4 has been amended to correct a typographical error in the patent number in line 26, and change it from "U.S. Patent No. 3,871,445" to U.S. Patent No. 3,898,295. U.S. 3,898,295, whose inventors are Oskar Wanka, Friedrich Gutlhuber and Cedomil Persic, is the correct patent number. The number of US 3,871,445 referred to in the paragraph at lines 5-25 on page 3 was inadvertently inserted at line 26. A copy of U.S. Patent No. 3,898,295 is enclosed with this response along with a Supplemental Information Disclosure citing this reference.

The paragraph at line 30 on page 4 to line 13 on page 5 has been amended to correct typographical errors and change "Profilein" to Profile in at line 33 of page 4, and to change "invariable" to in variable in line 4 of page 5.

The paragraph at line 19 on page 13 to line 2 on page 14 has been amended to correct a typographical error and change "manual" to manifold at line 20 of page 13. Also in this paragraph, the numbers for the reference characters of Figures 4 and 5 have been amended by placing the number "2" before each reference character number in order to clarify that the reference characters of Figures 4 and 5 are different from the reference characters used in Figure 2.

No new matter has been added by these amendments.

In the Drawings, Figure 1 has been amended to add the notation "Prior Art" as requested by the Examiner. Figures 4 and 5 have been amended to place the number "2" prior to each reference character number to clarify that the reference characters of Figures 4 and 5 differ from those of Figure 2.

In the claims, Claim 11 has been retained as it was inadvertently not included in the elected species claims in response to the restriction requirement filed May 13, 2004. Claim 11 depends from Claim 10, which was included in the

elected species and adds the limitation to Claim 10 that the geometric factor of each downstream zone is larger than the contiguous upstream zone for the sequence of zones comprising at least three zones. This same limitation appears in Claim 8, which now depends from Claim 1. Claim 10 differs from claim 1 in having a narrower range for the geometric factor. It is clear that Claim 11 should be included in the elected species.

Applicants respectfully request that Claim 11 be reinstated.

Claims 12-32 have been withdrawn subject to the restriction requirement mailed March 15, 2004; however, Applicants retain the right to present claims 12 to 32 in a divisional application.

New claims 33 and 34 have been added. Claim 33 is drawn to a flow reactor according to Claim 1, wherein each downstream zone has a larger cross-section than the contiguous upstream zone, and wherein the geometric factor of each downstream zone is larger than the contiguous upstream zone for the sequence of zones comprising at least three zones.

Claim 33 is drawn to a flow reactor according to Claim 1, wherein each downstream zone has a larger cross-section than the contiguous upstream zone, and wherein the geometric factor of each downstream zone is larger than the contiguous upstream zone for the sequence of zones comprising at least four zones.

Claim 34.is drawn to a flow reactor according to Claim 1, wherein each downstream zone has a larger cross-section than the contiguous upstream zone, and wherein the geometric factor of each downstream zone is larger than the contiguous upstream zone for the sequence of zones comprising at least four zones.

Claim 33 adds the limitations of both Claim 5 and Claim 8 to Claim 1.

Claim 34 adds the limitations of Claim 5 to Claim 1 and additionally provides that the geometric factor of each downstream zone is larger than the contiguous upstream zone for the sequence of zones comprising at least four zones.

Applicants do not agree with the Examiner's contention that Claim 10 must be amended simply because it recites limitations included in claim 7 before further limiting that claim; however, to further prosecution, Claim 10 has been amended to read as follows:

Claim 10. The flow reactor according to Claim 1, wherein the geometric factor has values in a range from about 0.015 to about 0.100.

35 USC § 102 Rejection

Claims 1-6 and 9 were rejected under 35 USC 102(b) as being anticipated by DE 29 29 300.

Claim 1 has been amended to provide that the sequence of zones comprises at least three zones and to incorporate the language from Claim 7 which provides that the cross-section of the conduit in each zone has a substantially circular form with a diameter such that the third power of the diameter is equal to the product of the volume and a geometric factor having values in a range from about 0.01 to about 0.50. Claim 7 has been canceled and Claim 8 has been amended to depend from Claim 1. Claims 2-6 and 9 all depend from Claim 1.

There is no disclosure in DE 29 29 300 of a flow reactor comprising a plurality of walled conduits each having an outer surface disposed for contact with a heat-transfer medium, an inlet distribution manifold adapted for flow communication with a downstream manifold through channels formed by heterogeneous catalytic material disposed within each conduit during operation in a sequence of zones for catalyst having the same or different length along the longitudinal coordinate of the conduit and within each zone essentially uniform cross-section of the conduit measured in a plane perpendicular to the longitudinal coordinate thereby defining volume of the zone, and the sequence of zones comprising at least three zones such that each downstream zone has a different cross-section than the contiguous upstream zone and wherein the cross-section of the conduit in each zone has a substantially circular form with a diameter such that the third power of the diameter is equal to the product of the volume and a geometric factor having values in a range from about 0.01 to about 0.50.

Therefore, Claims 1-6 and 9 are not anticipated by DE 29 29 300, and are patentable thereover.

35 USC § 103 Rejection

Claims 7, 8, and 10 were rejected under 35 USC § 103(a) as being unpatentable of DE 29 29 300 as applied to claims 1-6 and 9 above. Applicants respectfully traverse this rejection.

Claim 7 has been canceled and its provisions incorporated into claim 1 as discussed above.

DE 29 29 300 does not disclose or teach the concept of the flow reactor geometric factor of Applicant's invention. DE 29 29 300 does not teach or disclose that the cross-section of the conduit in each zone of the reactor has a substantially circular form with a diameter such that the third power of the diameter is equal to the product of the volume and a geometric factor having values in a range from about 0.01 to about 0.50. The DE 29 29 300 inventors had no appreciation of the concept of the relationship of volume to diameter and the geometric factor discovered by Applicants.

As stated above, Claim 1 has been amended to incorporate the limitation of Claim 7 and to provide that the flow reactor of the present invention contains sequence of zones comprises at least three zones such that each downstream zone has a different cross-section than the contiguous upstream zone and wherein the cross-section of the conduit in each zone has a substantially circular form with a diameter such that the third power of the diameter is equal to the product of the volume and a geometric factor having values in a range from about 0.01 to about 0.50.

Applicants' contend that there is nothing in DE 29 29 300 which would lead one skilled in the art to Applicant's claimed invention. It is only by using Applicant's invention and applying hindsight that one might try to argue that by manipulating zone dimensions it might be possible to come up with an arrangement of zones which meet Applicant's requirement that the cross-section of the conduit in each zone has a substantially circular form with a diameter such

that the third power of the diameter is equal to the product of the volume and a geometric factor having values in a range from about 0.01 to about 0.50.

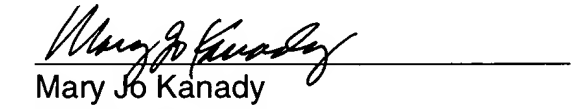
In determining obviousness, the invention as a whole must be considered. In the present case, the invention as a whole includes Applicants' discovery of the value of having a series of zones wherein the cross-section of the conduit in each zone has a substantially circular form with a diameter such that the third power of the diameter is equal to the product of the volume and a geometric factor having values in a range from about 0.01 to about 0.50 in order to obtain the optimal results.

The recognition by Applicants of the relationship between the result produced and the particular design parameters renders Applicants' claimed invention nonobviousness. The art did not recognize that the parameter optimized by Applicants was a result effective variable. Therefore, Applicant's claims as amended are not obvious and are patentable over DE 29 29 300. See In re Antonie, 559 F.2d 618, 619, 195 U.S.P.Q. 6, 8 (C.C.P.A. 1977).

Applicants' submit that in view of the above amendments and remarks, Claims 1-6 and 8-11 are neither anticipated by nor obvious over DE 29 29 300.

Reconsideration and allowance of all claims is respectfully requested.

Respectfully submitted,



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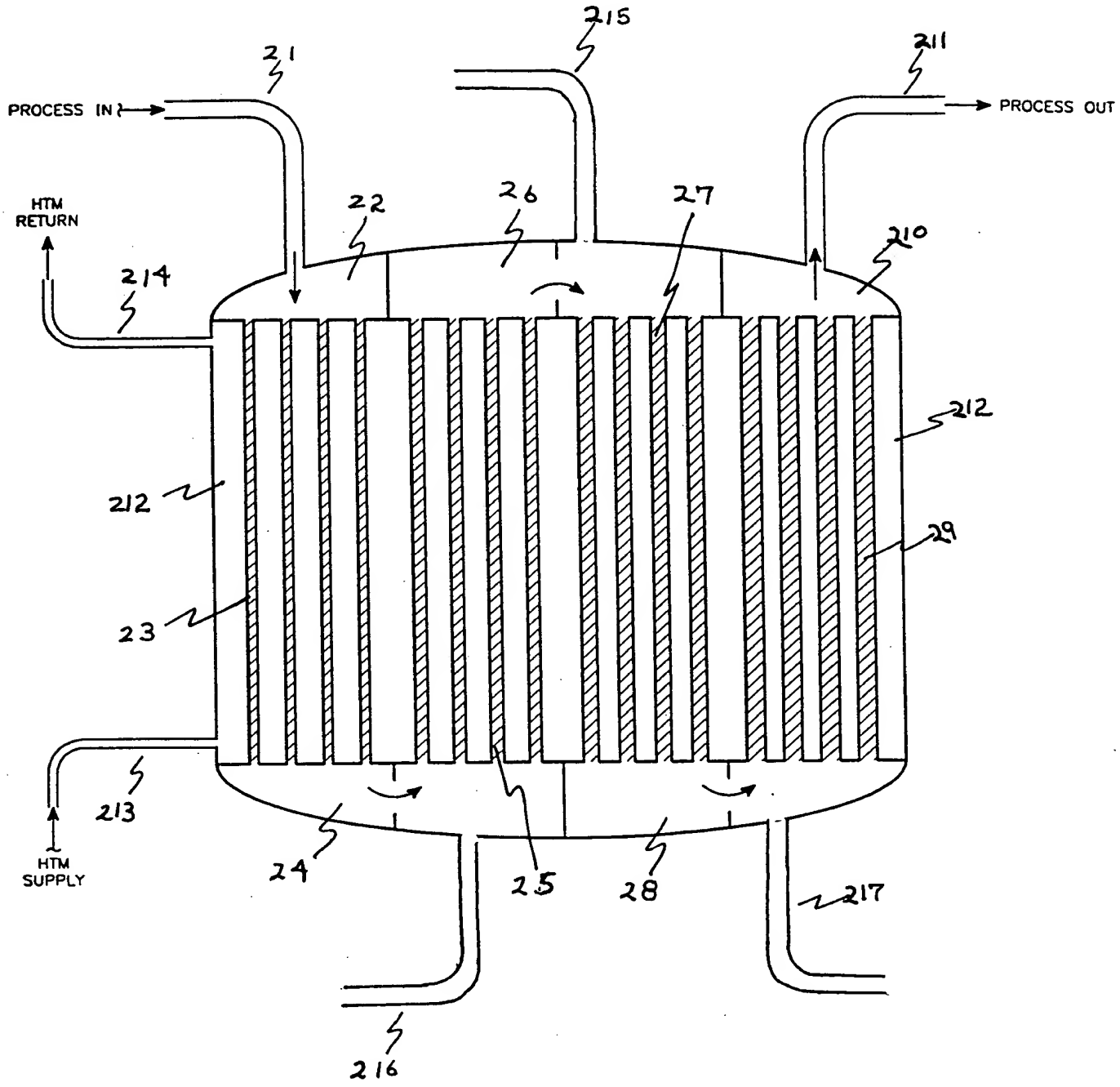

FIGURE 4

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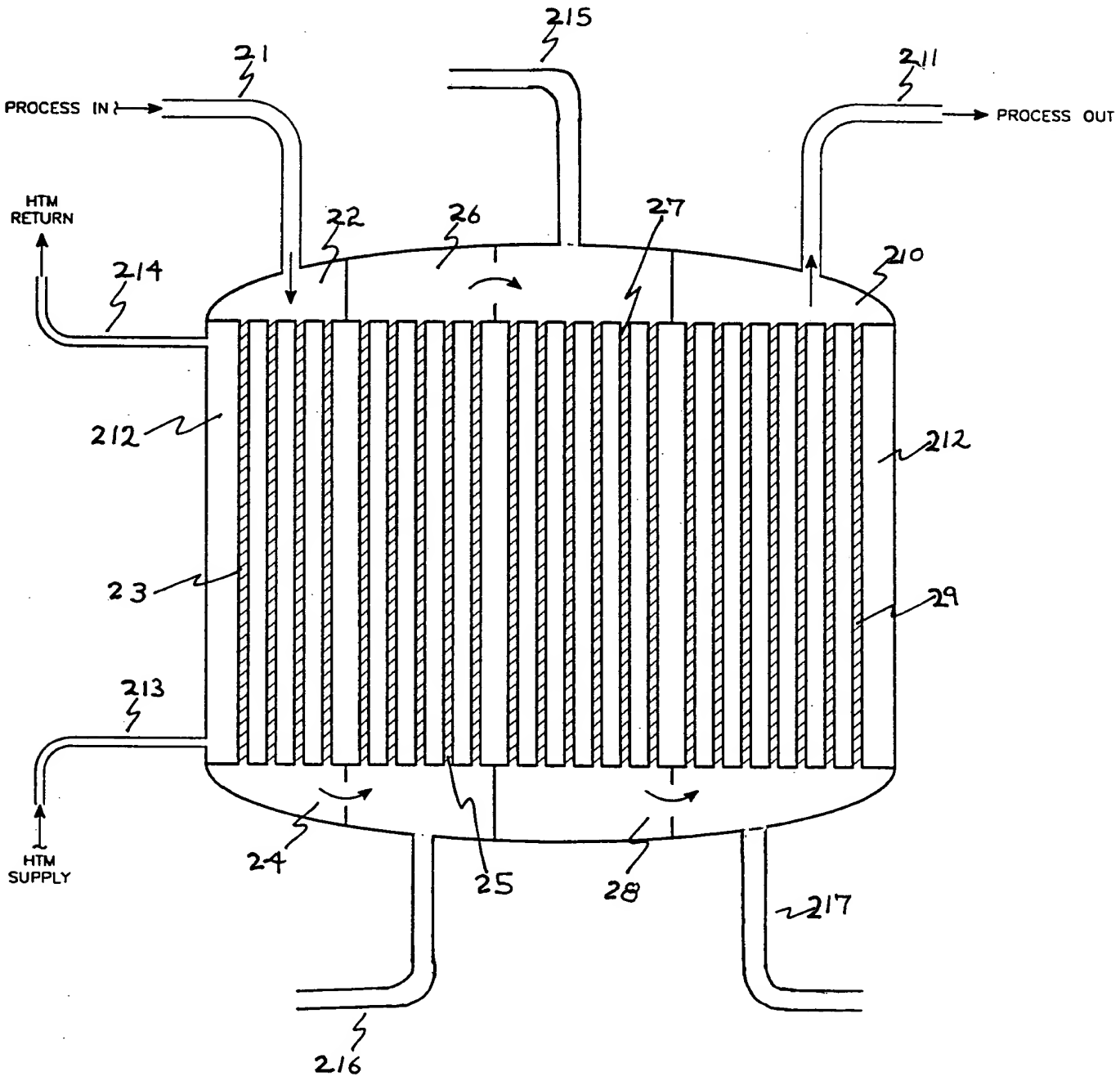

FIGURE 5